A dark blue silhouette of a pregnant woman is shown in profile, facing right. She is holding her belly with her right hand. The background is a light, warm-toned image of a window with vertical blinds, partially obscured by the silhouette.

# **New York State Maternal Mortality Review Report: A Comprehensive Review of the 2014 Cohort**



**Department  
of Health**



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# Section 1: Executive Summary

## Purpose of Report

A 2018 report released by America's Health Rankings® ranked New York State (NYS) 30<sup>th</sup> in the nation for its maternal mortality rate<sup>1</sup>. Although New York's ranking held steady compared to 2016<sup>2</sup>, the NYS' 2015-2017 maternal mortality rate is 1.7 times the Healthy People 2020 target. Racial disparities remained significant with recent data (2015-2017) showing New York State black women are over three times more likely to die in childbirth than white women.

Since its inception in 2010, the Maternal Mortality Review Initiative (MMRI) has aimed to maintain a comprehensive view of the factors leading to maternal death and to inform interventions intended to reduce the risk of these deaths. The MMRI is consistent with the objectives of the *Prevention Agenda 2019-2024: New York's State Health Improvement Plan* which aims to reduce maternal mortality in the state by 22% to 16.0 per 100,000 live births and to improve the racial and ethnic disparities in the state maternal death rate by 34% by the end of 2024.

The goal of MMRI is to identify all **pregnancy-associated** deaths (deaths of a woman within one year of being pregnant, including deaths while pregnant) in New York State and to conduct a comprehensive review of factors leading to **pregnancy-related** deaths (either directly caused or exacerbated by the pregnancy), as well as provide information to develop strategies and interventions to decrease the risk of these deaths. The MMRI also provides an overview of the deaths that were pregnancy-associated, but not related. The data sources used to identify pregnancy-associated deaths included linked death, birth and hospital discharge records and events reported to the New York Patient Occurrence and Reporting Tracking System (NYPORTS).

Once maternal deaths are identified, each is reviewed using a standardized review tool that collects medical information on past pregnancies, prenatal and intrapartum medical history, prenatal hospitalizations, and the postpartum period. Data are analyzed and aggregated for review, discussion and action. To provide expert input into the initiative, the New York State Department of Health (the Department) established a Maternal Mortality Review (MMR) Committee of multidisciplinary clinicians and other key stakeholders from professional organizations and hospitals. Based on the trends in data collected through the MMR, the committee provides recommendations for prevention and improvements in medical care and management as well as identifying focus areas for education.

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<sup>1</sup> America's Health Rankings. (2019). *2018 Health of Women and Children Report: New York*. Retrieved from <https://www.americashealthrankings.org/learn/reports/2018-health-of-women-and-children-report/state-summaries-new-york>

<sup>2</sup> America's Health Rankings. (2019). *2016 Health of Women and Children Report: New York*. Retrieved from <https://www.americashealthrankings.org/learn/reports/2016-health-of-women-and-children-report/state-summaries-new-york>

## Section 1: Executive Summary

### Key findings

- The MMRI identified 33 pregnancy-related and 54 pregnancy-associated, but not related deaths in 2014.
- A majority of women in the pregnancy-related deaths cohort were in their thirties (30-39), spoke English as their primary language, delivered in a Level 3 hospital or Regional Perinatal Center, delivered by cesarean section, and died within 1 week of the end of pregnancy.
- Black, non-Hispanic women comprised about half (51.5%) of the pregnancy-related death cohort, followed by White, non-Hispanic women (30.3%), Hispanic (12.1%) and other, non-Hispanic (6.1%).
- Black, non-Hispanic women were overrepresented in the pregnancy-related death cohort, given that the births to Black, non-Hispanic women represented only 15% of the live births in New York State while the deaths to Black, non-Hispanic women represented 51.5% of the pregnancy-related death cohort.
- Black, non-Hispanic women were over five times more likely to die from pregnancy-related deaths than White, non-Hispanic women (48.0 deaths per 100, 000 live births for Black, non-Hispanic women vs 8.7 for White, non-Hispanic women).
- Medicaid provided health insurance coverage for most of the women in the pregnancy-related deaths cohort (63.6%), while Medicaid was the primary health insurance coverage for half of live births (50.9%) in 2014.
- Over half of the pregnancy-related deaths occurred within a week of the end of the pregnancy (66.7%). The largest proportion of deaths occurred the day after the end of pregnancy (45.5%).
- Women with full-term pregnancies represented the largest proportion of deaths for Black, non-Hispanic and other, non-Hispanic groups, while women with gestational age of 28-33 weeks at the time of death represented the largest proportion of deaths for White, non-Hispanic and Hispanic groups.
- The leading causes of pregnancy-related deaths were infection (21.2%), hemorrhage (15.2%), cardiomyopathy (12.1%), embolism (12.1%) and pulmonary problems (12.1%).
- The leading causes of pregnancy-associated deaths were injury (55.0%), cancer (10.0%), neurologic/neurovascular problems (6.7%), and pulmonary problems (6.7%). Of the deaths caused by injuries, substance overdose (36.4%) and motor vehicle accident (27.3%) were the top reported injuries.
- Nearly a third of the pregnancy-related deaths could have been prevented, based on the reviewer's determination that there was at least some chance of death being averted by changes to patient, family, provider, facility, system and/or community factors.

## Section 2: Overview

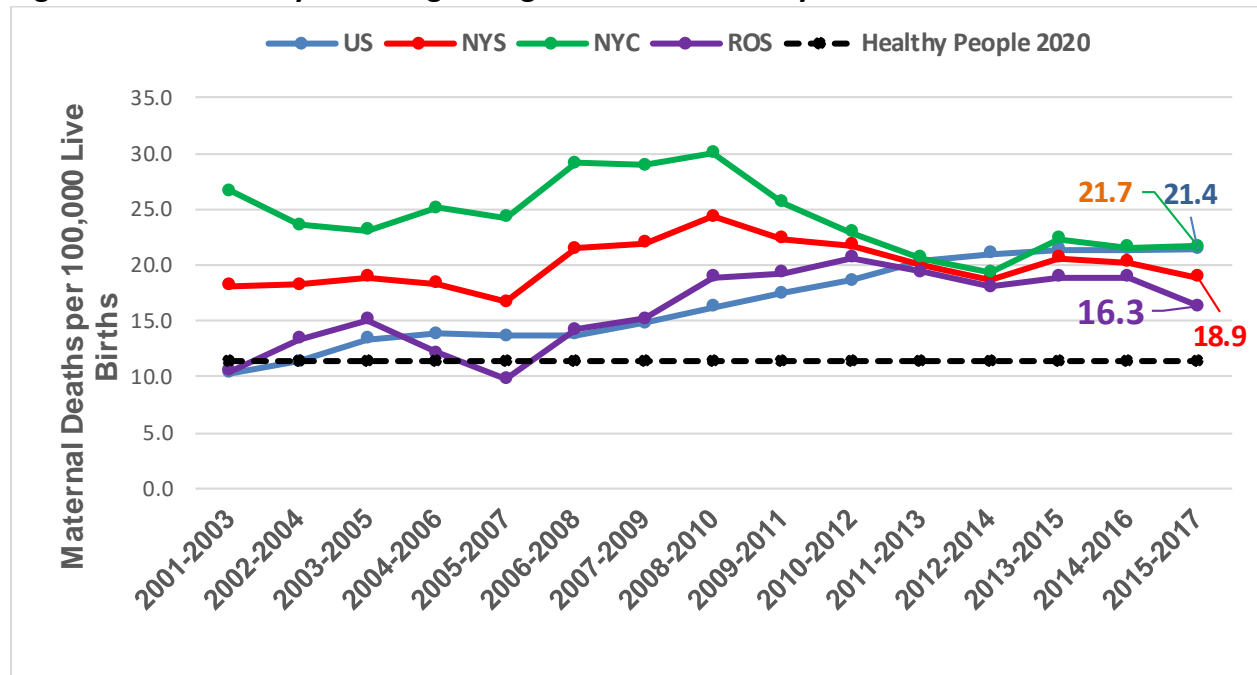
### Background

A 2018 report released by America's Health Rankings® ranked New York State (NYS) 30<sup>th</sup> in the nation for its maternal mortality rate<sup>1</sup>. Although New York's ranking held steady compared to 2016<sup>2</sup>, the NYS 2015-2017 maternal mortality rate of 18.9 deaths/100,000 live births is 1.7 times the Healthy People 2020 target of 11.4/100,000. Racial disparities remained significant with recent data (2015-2017) showing New York State Black women are over three times more likely to die in childbirth than White women.

### Maternal mortality in New York State

The maternal mortality rate in NYS peaked at 24.4 per 100,000 live births in 2008-2010 and decreased to 18.7 per 100,000 live births in 2012-2014 (Figure 1a). As of 2015-2017, New York's maternal mortality rate is stable at 18.9. The difference in maternal mortality rates between New York City (NYC) and the Rest of the State (ROS) was smallest in 2012-2014. The difference increased in 2015-2017 with the NYC rate of 21.7 slightly above the national rate of 21.4, whereas the ROS rate decreased to 16.3.

Figure 1a. NYS three-year rolling average maternal mortality rate

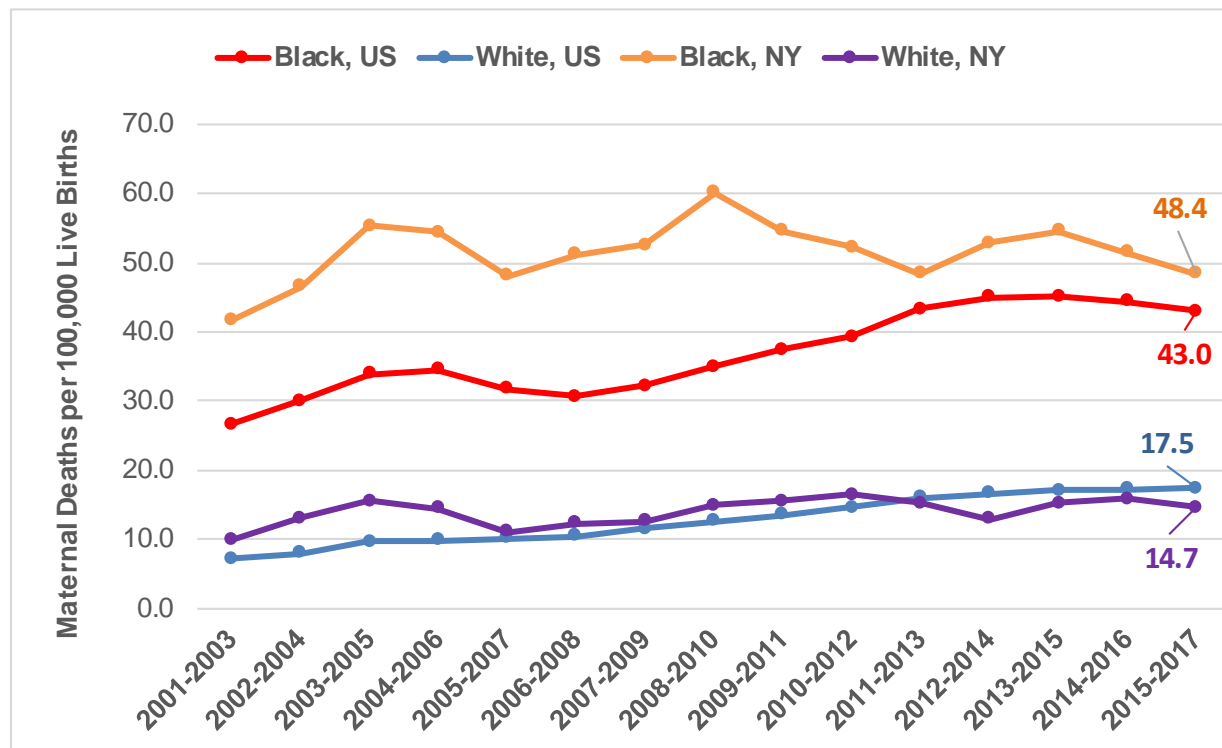


Source: NYS Vital Statistics, CDC Wonder Database

Racial disparities in maternal deaths are persistent; the statewide Black to White mortality ratio in New York varied between 4.3 to 1 in 2005-2007 and 3.2 to 1 in 2011-2013 (Figure 1b).

## Section 2: Overview

Figure 1b. NYS three-year rolling average maternal mortality rate by race



Source: NYS Vital Statistics, CDC Wonder Database

### Definitions

The following definitions will be used throughout this report. Additional terms are defined in the Glossary included in the Appendix.

**Pregnancy-related death:** death of a woman while pregnant or within a year from termination of pregnancy, occurring as a result of a pregnancy-related illness (i.e. preeclampsia) or as a result of an underlying illness exacerbated by the physiology of pregnancy (i.e. mitral stenosis). A pregnancy-related death that occurred within 42 days of the termination of the pregnancy is a **maternal death**.

**Pregnancy-associated, not related death:** death of a woman while pregnant or within one year of termination of pregnancy from any cause, not as a cause of pregnancy or illness exacerbated by pregnancy (e.g. motor vehicle accident.)

**Maternal mortality ratio:** number of maternal deaths per 100,000 live births in a given year.

**Termination of pregnancy:** end of a pregnancy regardless of the process that led to it; this term includes live births (vaginal deliveries and cesarean sections), spontaneous and induced abortions.

## Section 2: Overview

**Revised graduated index of prenatal care utilization:** measure of the adequacy of prenatal care provided to a woman by healthcare providers during the prenatal period. The index is "useful for research focusing on birth outcomes and for monitoring trends in the proportion of cases with intensive use of prenatal care"<sup>3</sup>. It relies on case-specific prenatal care information, including the number of prenatal visits, gestational age of the newborn, and the date when prenatal care began.

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<sup>3</sup> Alexander GR, Kotelchuck M. Quantifying the adequacy of prenatal care: a comparison of indices. *Public Health Rep.* 1996; 111(5):408–18; discussion 19. Epub 1996/09/01. PMID: 8837629.



## Section 3: Data Sources and Methods

### Source of data

In the MMR initiative, the Department conducts comprehensive surveillance activities based on linked birth and death data from vital records, hospital in-patient and emergency department data from the Statewide Planning and Research Cooperative System (SPARCS) and hospital-based adverse event data from the New York Patient Occurrence Reporting and Tracking System (NYPORTS).

NYPORTS is a statewide, mandatory reporting system that collects information from hospitals and diagnostic and treatment centers concerning adverse events defined as unintended, adverse and undesirable developments in a patient's condition. Maternal deaths are one of the 31 occurrences reportable to NYPORTS.

### Methods

#### *Identification of cases for surveillance*

Cases are organized for surveillance based on ascertainment data sources mentioned above. The data used to determine cases for surveillance consists of death records of women ages 10 to 55 years who died within one year (365 days) from termination of pregnancy. There are two types of surveillance: Standard surveillance and enhanced surveillance.

Standard surveillance consists of female deaths linked to a live birth or a fetal death with a year or less between the two events. Maternal death certificates are linked to a live birth or a fetal death certificate to identify the standard surveillance cases.

Enhanced surveillance is added to expand the case identification by focusing on the examination of female death records not linked to a live birth certificate or a fetal death certificate. The enhanced surveillance cases include:

- Female death certificates not linked to a live birth certificate or a fetal death certificate but with an ICD-10 code indicating an obstetric cause of death and/or pregnancy indicated on a death certificate;
- Female death certificates not linked to a live birth certificate or a fetal death certificate but with an indication of pregnancy from SPARCS hospital records. The hospital records with an indication of pregnancy from SPARCS are identified using a broad list of ICD-9 codes for pregnancy-related diagnoses and procedure codes (List available upon request); and
- NYPORTS cases not captured under standard surveillance.

## Section 3: Data Sources and Methods

### *Review process*

Once the Department identifies and prioritizes potential maternal mortality cases, the cases are sorted into two workflows, depending on the likelihood that the cause of death is pregnancy-related. Cases considered likely to be pregnancy-related are assigned to the Department's medical record review contractor, Island Peer Review Organization, Inc. (IPRO). In addition, all cases with NYPORTS reports are assigned to IPRO. Cases where the cause of death appears to be pregnancy-associated, not related, are retained at the Department for review by an internal consulting obstetrician (OB), as are cases where there is a doubt that the woman was pregnant within the year prior to her death.

For IPRO review purposes, certified copies of the medical record and autopsy report (if performed) are requested and submitted to IPRO. A nurse reviewer conducts a standardized record review, prepares a narrative summary of the case, and completes the NYS MMR Data Collection Form. This form was developed by the Department based on multiple tools from national and local initiatives with the goal of ensuring a comprehensive review of the pertinent case history. In addition to demographic, medical, psychosocial and intimate partner violence information, the data collection tool addresses the cause of death, the potential preventability of the death (based on clinical review), past pregnancies, prenatal and intrapartum medical history, prenatal hospitalizations, and postpartum information. This form is available upon request.

Once the case review is completed by the nurse reviewer, the completed package, including the MMR Data Collection Form, autopsy report, case summary and medical record, is sent to an independent obstetrician credentialed by IPRO. The IPRO obstetrician reviews the abstracted information and prepares a NYS MMR Physician Case Decision Form which includes information such as the physician determination of the cause of death and contributing factors. Depending on the issues identified, the IPRO obstetrician may recommend that the case be sent to other independent medical specialists, such as a physician specializing in infectious disease or cardiology, for review and preparation of a supplemental case summary.

For non-IPRO cases, an internal consulting OB reviews the available information for each case to determine if the woman was pregnant in the appropriate timeframe and, if so, whether her death was due to a pregnancy-related or pregnancy-associated, but not related cause. If the consulting OB determines that the cause of death was pregnancy-related, the case is moved into the IPRO workflow, detailed above. If the cause of death was pregnancy-associated, but not related, the Department staff complete the MMR Data Collection Form.

The cases completed by IPRO and the internal consulting OB reviewer are compiled by the Department for data entry into a custom-developed MMR database. The MMR database maintains a composite of all available sources of information for each case. Except for the comparisons with the reference population (noted in the report), this report presents the analysis of the data collected during the MMR review process of the 2014 deaths.

## Section 4: Findings from the 2014 Cohort

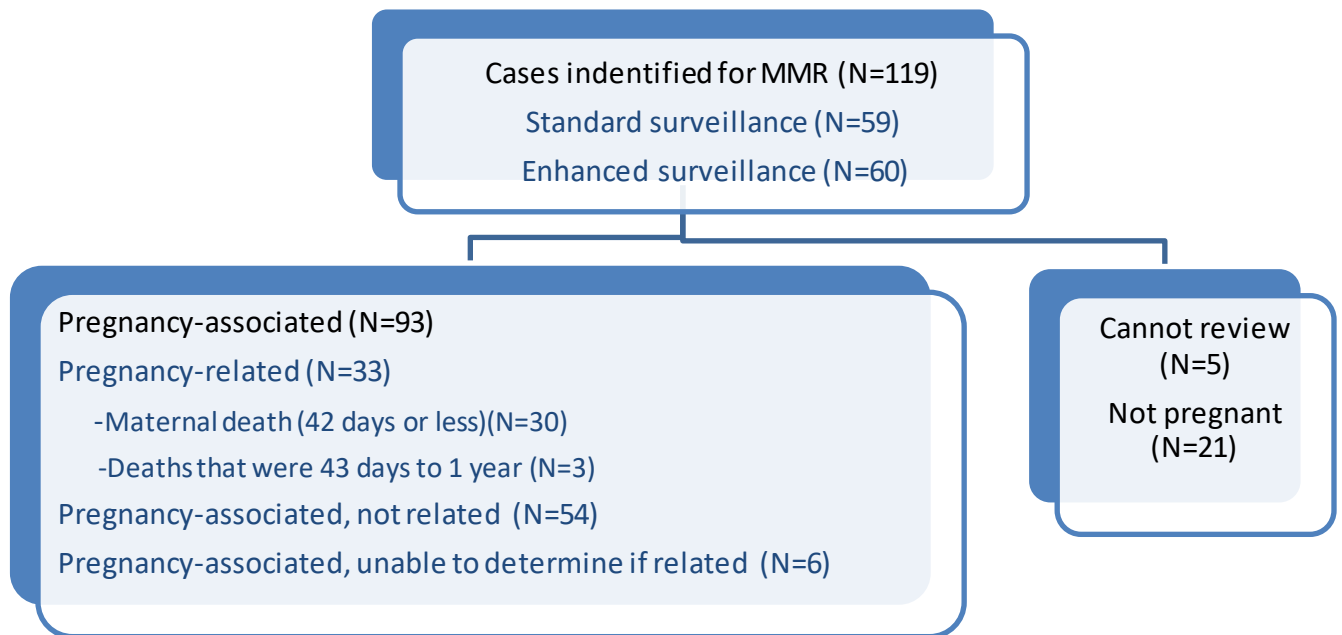
### Case identification

Death records of females ages 10-55 years old from 2014 were linked to 2013 - 2014 birth and fetal death records to identify the standard surveillance cases. Under standard surveillance, a total of 59 potential pregnancy-associated deaths were identified (Figure 2). Enhanced surveillance yielded 60 additional records of females ages 10-55 years old who died within one year after a hospitalization with an indication of pregnancy and/or had death certificate with indication of pregnancy. A total of 119 cases were identified.

The review of the medical records available for these deaths identified 33 pregnancy-related deaths, 54 pregnancy-associated, not related deaths and 6 pregnancy-associated, but unable to determine pregnancy-relatedness deaths. Five cases could not be reviewed as no hospital medical records were identified as associated with these cases at the time of case review.

Most of the pregnancy-related deaths were identified through standard surveillance: 26 were identified through standard surveillance and seven were identified through enhanced surveillance. However, about half of the pregnancy-associated deaths were identified through enhanced surveillance (27 out of 60 deaths). Furthermore, most pregnancy-related deaths were maternal deaths (30 out of 33 deaths), which is defined as the death of a woman during pregnancy or within 42 days of termination of pregnancy.

**Figure 2. NYS surveillance of MMR deaths, 2014**



Source: NYS MMR

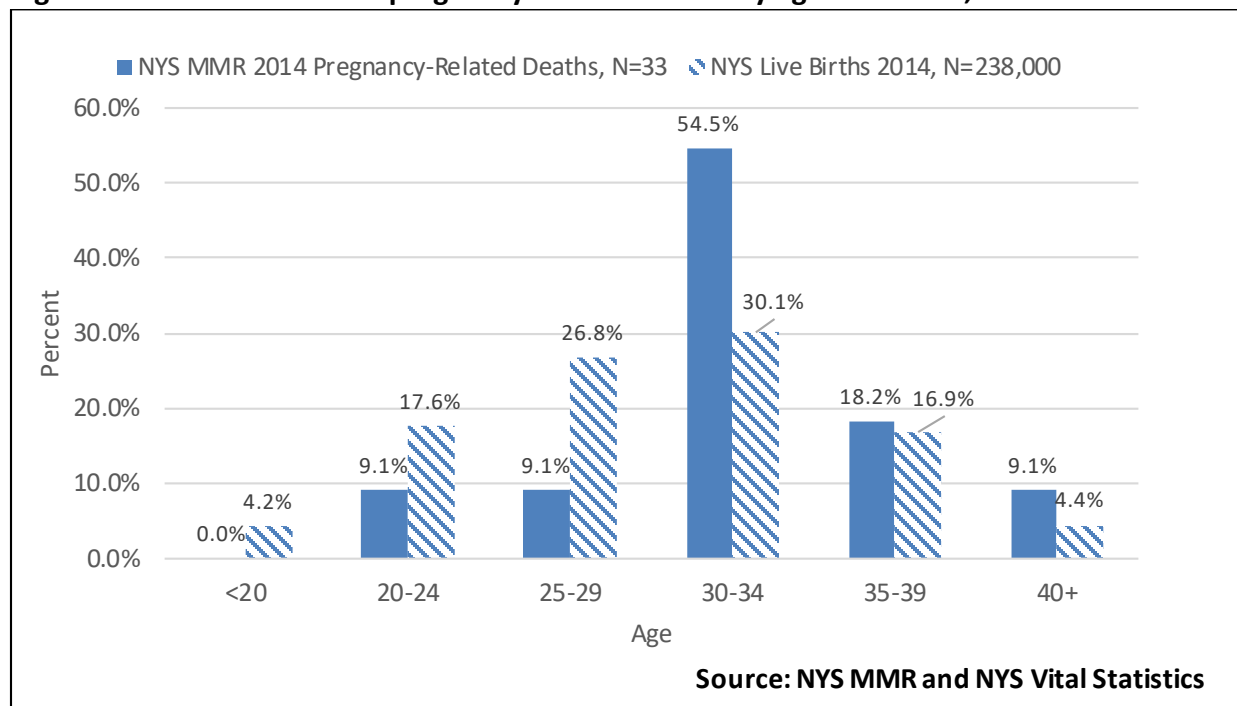
## Section 4: Findings from the 2014 Cohort

### Pregnancy-related deaths

#### Demographics

The majority (73%) of the 33 women in the 2014 pregnancy-related death cohort were 30-39 years old. Women in the age groups of 30-34 years old and over 40 years old were overrepresented in the pregnancy-related death cohort. About 55% of pregnancy-related deaths were in women between 30 and 34 years old while only 30% of the births were to women in that age group; about nine percent of deaths were in women over 40 years old and only four percent of births were to women in the same age group (Figure 3, Table 1).

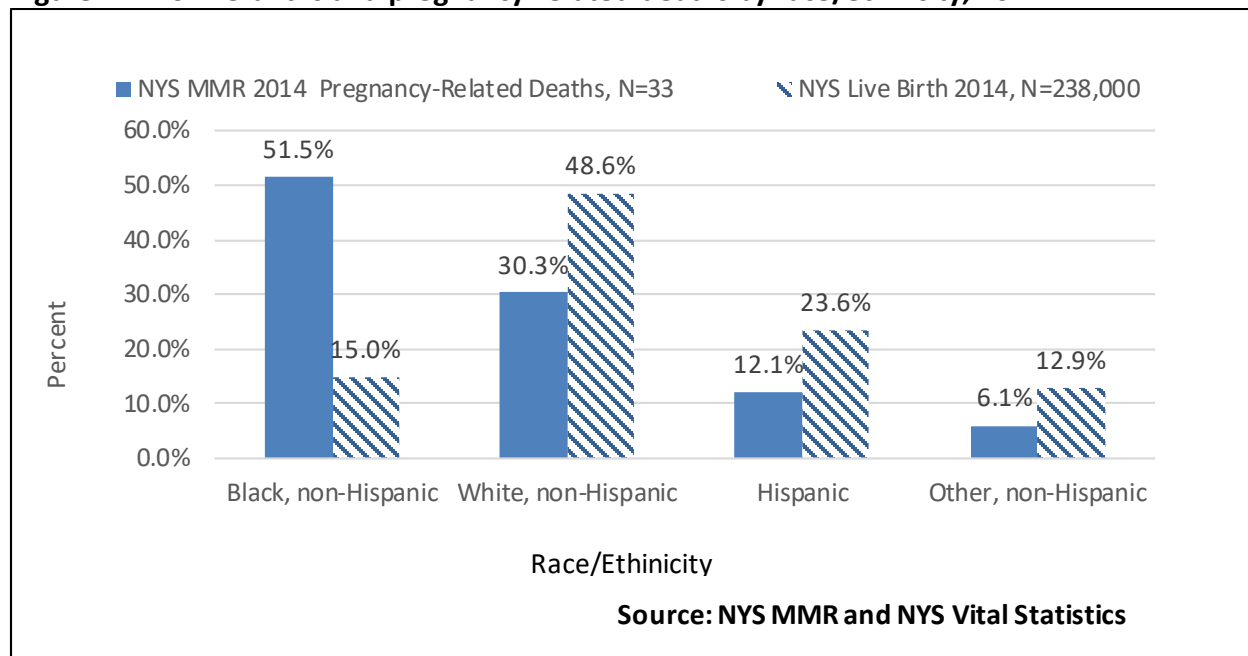
**Figure 3. NYS live births and pregnancy-related deaths by age of mother, 2014**



The majority of women in the pregnancy-related death cohort were non-Hispanic (87.9%). Black, non-Hispanic women comprised about half (51.5%) of the pregnancy-related death cohort, followed by White, non-Hispanic women (30.3%), Hispanic (12.1%) and other, non-Hispanic (6.1%). The race distributions of live births and pregnancy-related deaths showed that Black, non-Hispanic women were overrepresented in the pregnancy-related death cohort, given that the births to Black, non-Hispanic women represented only 15% of the live births in New York State while the deaths to Black, non-Hispanic women represented 51.5% of the pregnancy-related death cohort. On the other hand, the birth to White, non-Hispanic women represented 48.6% of the live births in New York State while the deaths to White, non-Hispanic women were only 30.3% of the pregnancy-related death cohort. This indicates the racial disparity in maternal mortality rates between Black, non-Hispanic and White, non-Hispanic women observed at the state level (Figure 4).

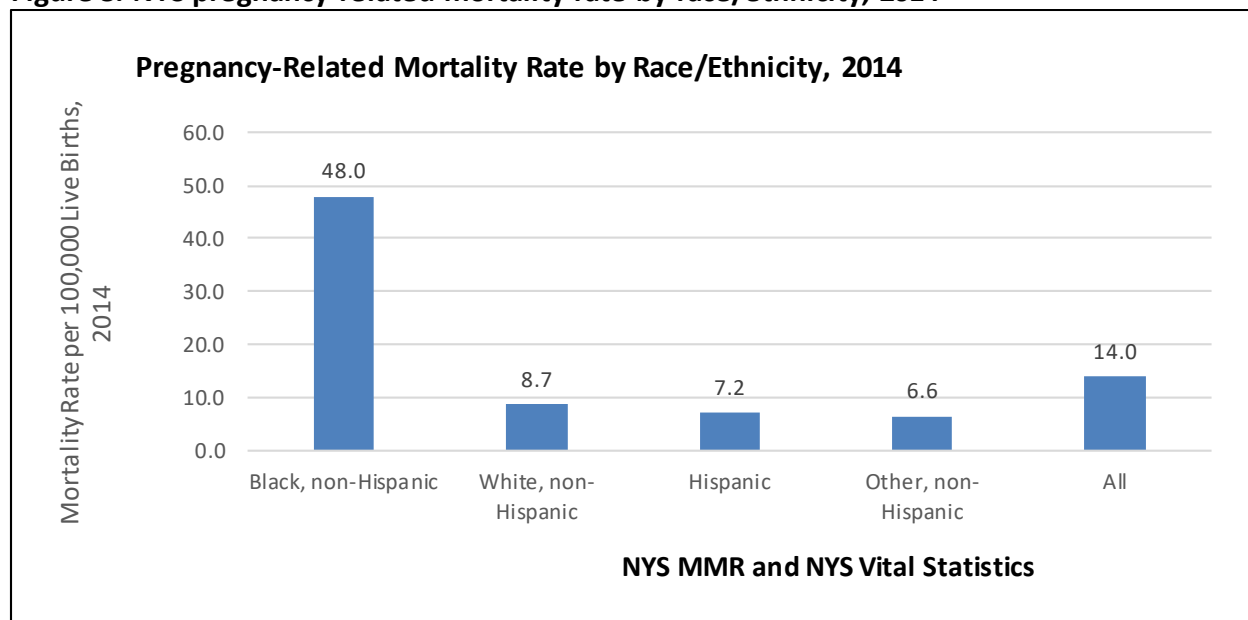
## Section 4: Findings from the 2014 Cohort

**Figure 4. NYS live births and pregnancy-related deaths by race/ethnicity, 2014**



A further look at the maternal mortality rate for pregnancy-related deaths per 100,000 live births in 2014 clearly shows the racial disparity between Black, non-Hispanic women and White, non-Hispanic women, with Black, non-Hispanic women over five times more likely to die from pregnancy-related deaths than White, non-Hispanic women (48.0 deaths per 100,000 live births for Black, non-Hispanic women vs 8.7 for White, non-Hispanic women) (Figure 5).

**Figure 5. NYS pregnancy-related mortality rate by race/ethnicity, 2014**



## Section 4: Findings from the 2014 Cohort

Among women in the pregnancy-related death cohort, 63.6% of the women had recorded employment status and over a third of them were employed during the index pregnancy (36.4%, Table 1). Occupation was recorded for 78.8% of women in the pregnancy-related death cohort. The occupations most frequently reported included professionals (18.2%), homemaker (18.2%) and service/housekeeper/child care (15.2%) (Table 1).

The pregnancy-related death cohort was comprised of women of all levels of educational attainment. About half of the women graduated from high school (54.5%). The proportion of women with less than a high school education and women with an Associate's /Bachelor's degree was the same (15.2%). Women with graduate or post-graduate education represented less than ten percent of the cohort (9.1%) (Table 1).

The majority of women in the pregnancy-related death cohort were on Medicaid (63.6%) with fewer on private insurance (18.2%) (Table 1). Primary language was reported as English for most women in the pregnancy-related death cohort (87.9%). Primary language was unknown for 3.0% and a language other than English was reported for the remaining 9.1%. The majority of women in the pregnancy-related death cohort were single (66.7%).

**Table 1. NYS pregnancy-related deaths: maternal demographic characteristics, 2014**

Demographic characteristics	Count (%)
<b>Age at death</b>	
<20	0(0.0%)
20-24	3 (9.1%)
25-29	3 (9.1%)
30-34	18 (54.5%)
35-39	6(18.2%)
40+	3(9.1%)
<b>Marriage status</b>	
Single	22(66.7%)
Married	11(33.3%)
<b>Primary language</b>	
English	29 (87.9%)
Not English	3(9.1%)
Unknown	1(3.0%)
<b>Employment status</b>	
Employed	12 (36.4%)
Unemployed	9 (27.2%)
Unknown	12 (36.4%)
<b>Occupation</b>	
Unemployed	7 (21.2%)
Professional/Management	6 (18.2%)
Homemaker	6 (18.2%)
Service/Housekeeper/Childcare	5 (15.2%)
Other	2 (6.0%)
Unknown	7 (21.2%)

## Section 4: Findings from the 2014 Cohort

<b>Education</b>	
Less than high school	5 (15.2%)
High School /GED/Some college	18 (54.5%)
Associate's/Bachelor's degree	5 (15.2%)
Graduate degree or higher	3 (9.1%)
Unknown	2 (6.1%)
<b>Health insurance</b>	
Medicaid/Family Health Plus	21 (63.6%)
Private insurance	6 (18.2%)
Child Health Plus B	2 (6.1%)
CHAMPUS/TRICARE	1 (3.0%)
Self-pay	1 (3.0%)
Other	1 (3.0%)
Unknown	1 (3.0%)
<b>Total</b>	<b>33 (100%)</b>

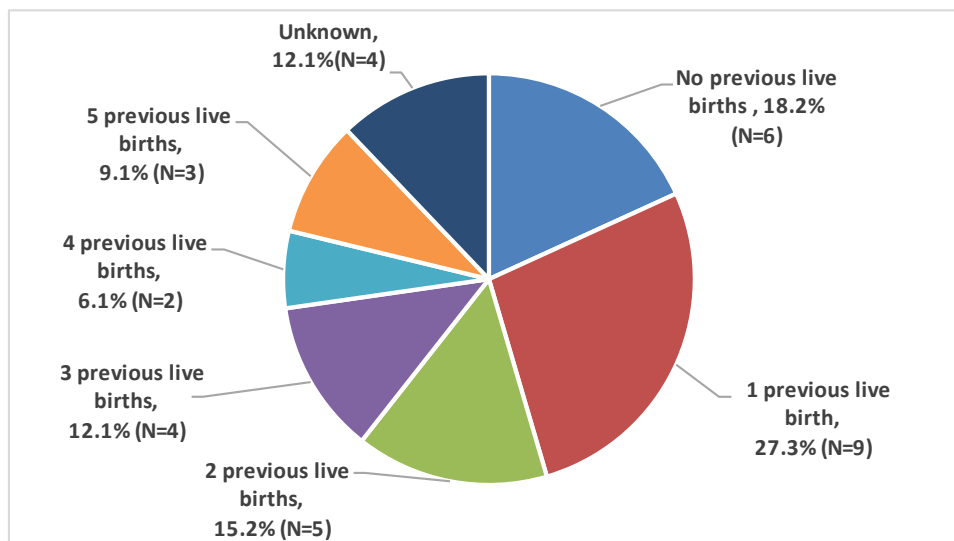
Source: NYS MMR

### *Prenatal history*

#### Previous live births

Six women (18.2%) in the pregnancy-related death cohort had no previous live births. The largest number of deaths occurred among women with one previous live birth and decreased as the number of live births increased: an inverse relationship (Figure 6).

**Figure 6. NYS pregnancy-related deaths: number of previous live births, 2014**



Source: NYS MMR

## Section 4: Findings from the 2014 Cohort

### Prenatal medical history

The facility providing prenatal care was known for 23 of the 33 women in the pregnancy-related death cohort. The majority of cases had only one facility reported as providing prenatal care (63.6%). Among those reported facilities, hospital clinics were the most common facility providing prenatal care (61.9%) followed by private offices (19.0%) and neighborhood health centers or high-risk clinics (9.5%).

**Table 2. NYS pregnancy-related deaths: facilities providing prenatal care, 2014**

Number of facilities reported	Count (%)
Unknown	10(30.3%)
None	2(5.9%)
<b>One facility</b>	<b>21(63.6%)</b>
Hospital Clinic	13 (61.9%)
Neighborhood Health Center	2(9.5%)
High-Risk Clinic	2(9.5%)
Private Office	4(19.0%)
<b>Total</b>	<b>33 (100%)</b>

Source: NYS MMR

In the pregnancy-related death cohort, 36.4% of cases reported only one prenatal care provider, two providers were reported for 3.0% of the cases, three providers were reported for 6.1% of the cases, and four providers for 3.0%. No provider was reported for 6.1% of the cases. Provider information was unknown for 45.5% of the women in the cohort. There were a total of 24 prenatal providers providing service for this cohort. Obstetricians were the most common prenatal care providers (54.2%, 13 out of 24) followed by nurse practitioners (16.7%, 4 out of 24), midwives (12.5%, 3 out of 24), perinatologists (8.3%, 2 out of 24), and physician assistants (8.3%, 2 out of 24) (Table 3).

The one pair of prenatal providers for the case with two prenatal providers included an obstetrician working with a midwife. In cases where there was a triad of prenatal care providers, one triad included an obstetrician working with a nurse practitioner and a perinatologist, and the other triad included a nurse practitioner working with a physician assistant and a perinatologist. The one quad of providers for the case with four prenatal care providers consisted of an obstetrician working with a nurse practitioner, a midwife and a physician assistant (Table 3).



## Section 4: Findings from the 2014 Cohort

**Table 3. NYS pregnancy-related deaths: number of prenatal care providers, 2014**

Number of providers reported	Count (%)
<b>Unknown</b>	<b>15(45.5%)</b>
<b>None</b>	<b>2(6.1%)</b>
<b>One provider</b>	<b>12(36.4%)</b>
Obstetrician	10
Nurse Practitioner	1
Midwife	1
<b>Two providers</b>	<b>1 (3.0%)</b>
Obstetrician, Midwife	1 set
<b>Three providers</b>	<b>2 (6.1%)</b>
Obstetrician, Nurse Practitioner, Perinatologist	1 set
Nurse Practitioner, Physician Assistant, Perinatologist	1 set
<b>Four providers</b>	<b>1 (3.0%)</b>
Obstetrician, Nurse Practitioner, Midwife, Physician Assistant	1 set
<b>Total</b>	<b>33 (100%)</b>

Source: NYS MMR

There were 30.3% (10 out of 33) cases with the documentation for high-risk referrals. Among these ten women who received high-risk referrals, seven women (70.0%) received high-risk care and the other three were unknown.

The revised graduated index of prenatal care utilization combines the trimester of pregnancy when the first prenatal care visit occurred, the number of visits and the length of pregnancy into a measure that reflects the completeness of prenatal care received during pregnancy. Data were missing on the trimester of initiation of prenatal care for 24.2% (n=8) of the women in the pregnancy-related death cohort and on the number of prenatal visits for 18.2% (n=6). In this cohort, over a third of women received adequate prenatal care (n=14, Table 4). Under a quarter of women were classified as intermediate (n=7), meaning that prenatal care was initiated during the first or second trimester, but the number of visits was less than recommended. Only 12.1% of cases (n=4) had intensive care, which means they had more visits than generally recommended. Inadequate prenatal care means starting prenatal care later and/or receiving fewer visits than those with intermediate prenatal care, and there were no women in the 2014 cohort that fell into this category. Three cases (9.1%) were classified as having no prenatal care. For 18.2% of cases (n=6), the information was not complete or was implausible (for example, gestation of 20 weeks and first visit during the third trimester).

## Section 4: Findings from the 2014 Cohort

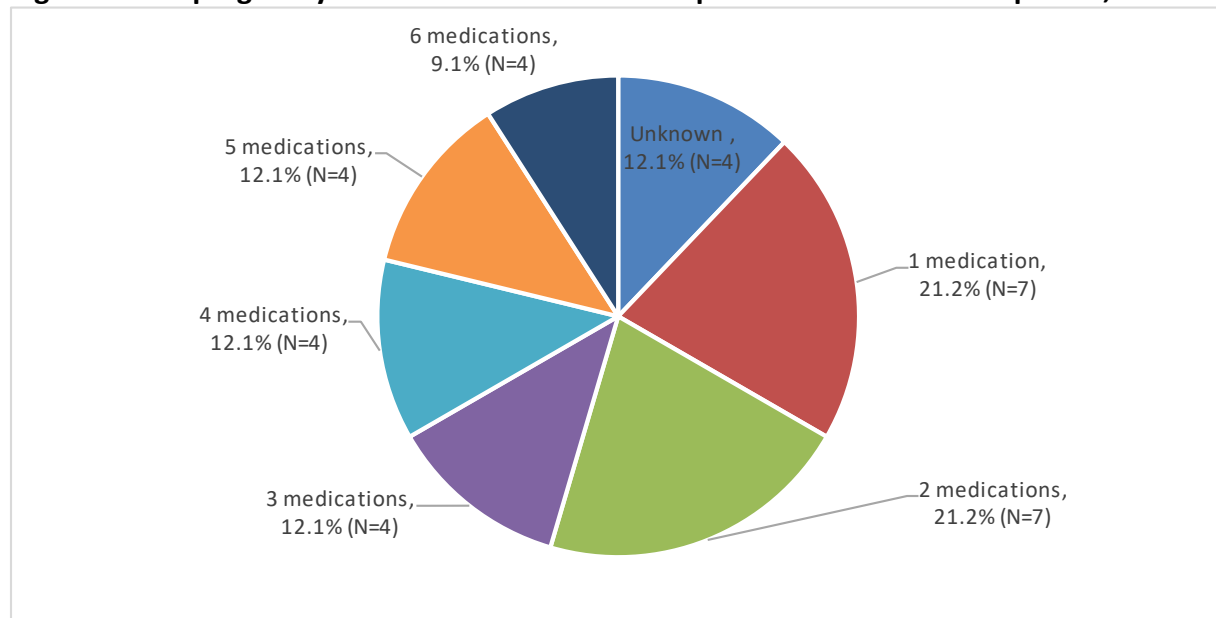
**Table 4. NYS pregnancy-related deaths: prenatal care utilization, 2014**

Prenatal care utilization	Count (%)
Adequate	14(42.4%)
Intermediate	6(18.2%)
Intensive	4(12.1%)
Inadequate	0(0.0%)
No prenatal care	3(9.1%)
Unknown	6(18.2%)
<b>Total</b>	<b>33 (100%)</b>

Source: NYS MMR

A list of medications taken prenatally was reported for 29 of the 33 women in the pregnancy-related death cohort. Among the pregnancy-related death cohort, 21.2% had one medication (n=7), 21.2% had two medications and 12.1% had three medications (Figure 7).

**Figure 7. NYS pregnancy-related deaths: number of prenatal medications reported, 2014**



Source: NYS MMR

Most frequently reported medications were prenatal vitamins/minerals (36.0%), antibiotics (13.5%) and dietary supplements (7.9%). Other medications listed were asthma medication and oral hypoglycemics/Insulin (5.6% each), laxative/softener (4.5%), narcotics and nonsteroidal anti-inflammatory (3.4% each), anticoagulant, antihistamine and corticosteroid (2.2% each) (Table 5).

## Section 4: Findings from the 2014 Cohort

**Table 5. NYS pregnancy-related deaths: types of prenatal medication reported, 2014**

Types of prenatal medication	Count (%)
Prenatal vitamins/minerals	32(36.0%)
Antibiotics	12(13.5%)
Dietary supplements	7(7.9%)
Asthma medication	5(5.6%)
Oral hypoglycemics/Insulin	5(5.6%)
Laxative/Softener	4(4.5%)
Narcotic (Rx only)	3(3.4%)
Nonsteroidal anti-inflammatory	3(3.4%)
Anticoagulant	2(2.2%)
Antihistamine	2(2.2%)
Corticosteroid	2(2.2%)
Anticonvulsants	1(1.1%)
Antidepressant/Anxiolytic	1(1.1%)
Antiemetic	1(1.1%)
Antirheumatic	1(1.1%)
Antiulcer	1(1.1%)
Hormones	1(1.1%)
Muscle relaxant	1(1.1%)
Other	2(2.2%)
Unknown	3(3.4%)
<b>Total</b>	<b>89 (100%)</b>

Source: NYS MMR

The top four reasons for using the medications listed were pregnancy (35.6%), asthma, diabetes and infection (6.9% each) (Table 6).

## Section 4: Findings from the 2014 Cohort

**Table 6. NYS pregnancy-related deaths: indication for prenatal medication reported, 2014**

Indication of prenatal medication	Count (%)
Pregnancy	31(35.6%)
Asthma	6(6.9%)
Diabetes	6(6.9%)
Infection	6(6.9%)
Urinary tract infection	5(5.7%)
Anemia	4(4.6%)
Pain and discomfort	3(3.4%)
Sickle cell disease	3(3.4%)
Constipation	2(2.3%)
Gastroesophageal reflux disease	2(2.3%)
Gastrointestinal distress	2(2.3%)
Nausea/Vomiting	2(2.3%)
Allergies	1(1.1%)
Blood clot	1(1.1%)
Epilepsy	1(1.1%)
History of preterm delivery	1(1.1%)
Irritable bowel syndrome	1(1.1%)
Low vitamin D level	1(1.1%)
Mental illness	1(1.1%)
Opioid dependence	1(1.1%)
Pneumonia	1(1.1%)
Preeclampsia	1(1.1%)
Not documented	5(5.7%)
<b>Total</b>	<b>87 (100%)</b>

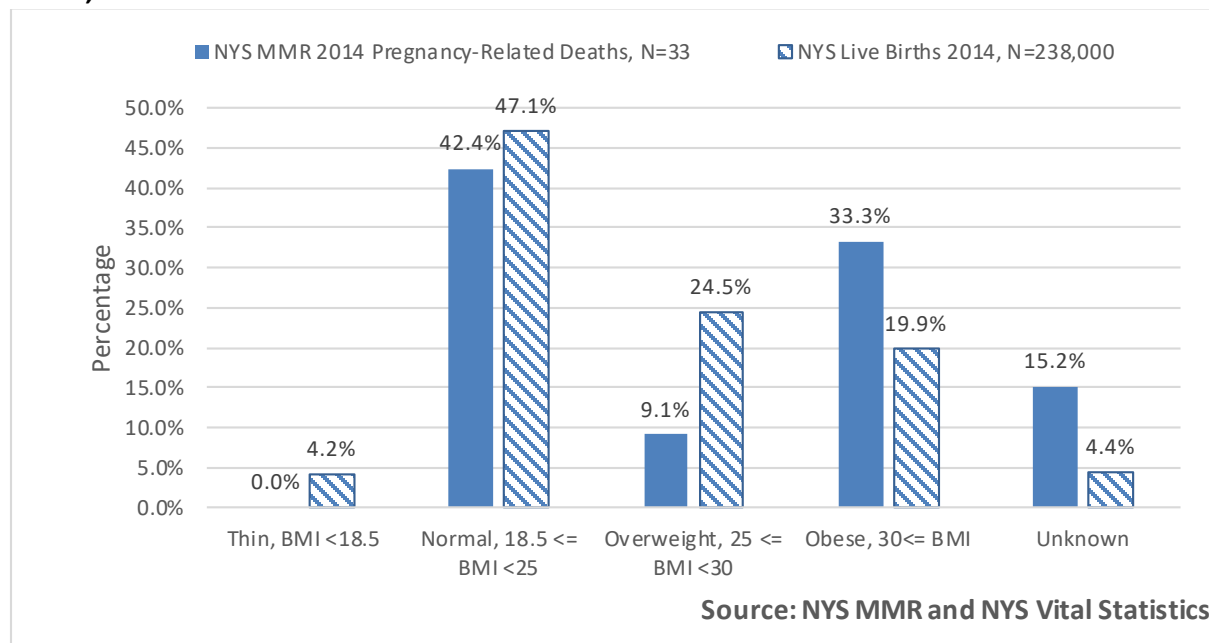
Source: NYS MMR

## Section 4: Findings from the 2014 Cohort

### Weight status

Pre-pregnancy weight and height were disproportionately missing for women in the pregnancy-related death cohort compared to women with live births in 2014. The graph below presents the distribution of mothers' pre-pregnancy body mass indices. However, it is difficult to draw conclusions given the small numbers and disproportionate missing data in the pregnancy-related death cohort.

**Figure 8. NYS live births and pregnancy-related deaths by mother's pre-pregnancy body mass index, 2014**



### *Intrapartum medical history*

#### Hospital of delivery or termination of pregnancy

Among the 30 pregnancy-related deaths with pregnancy outcomes that occurred in hospitals, in most cases (80.0%, n=24) the delivery or termination of pregnancy (TOP) occurred at a Level 3 hospital (40.0%, n=12) or a Regional Perinatal Center (40.0%, n=12). There were 16.7% of the deliveries or TOPs occurred at Level 1 or Level 2 hospitals (Level 1: 6.7%, n=2 and Level 2: 10.0%, n=3), and one delivery in a non-perinatal hospital.

#### Type of delivery

More than half of the 2014 pregnancy-related death cohort (60.6%, n=20) were cesarean deliveries and 21.2% (n=7) were normal spontaneous vaginal deliveries (NSVD). There were 18.2% (n=6) of women who died prior to delivery or died undelivered due to ectopic pregnancy or termination of pregnancy (Table 7). Among all cesarean deliveries, half were emergent (50.0%, 10/20), followed by elective scheduled (20.0%, 4/20), peri- or post-mortem (15.0%, 3/20) and unscheduled non-emergent (10.0%, 2/20) (Table 7).

## Section 4: Findings from the 2014 Cohort

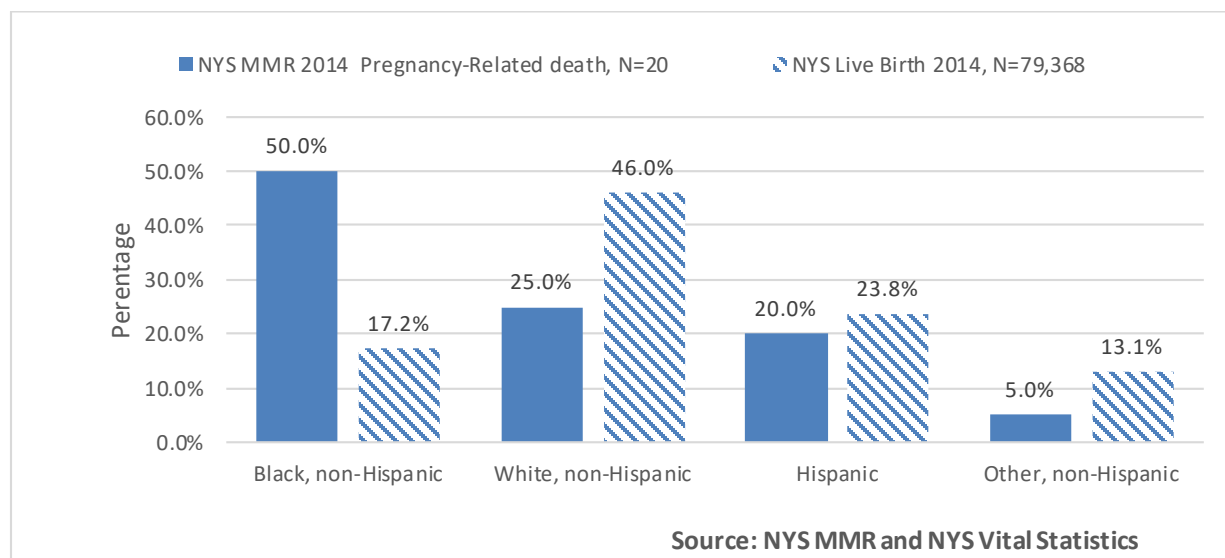
**Table 7. NYS pregnancy-related deaths: type of delivery, 2014**

Type of delivery	Count (%)
<b>Normal spontaneous vaginal delivery (NSVD)</b>	<b>7(21.2%)</b>
<b>Cesarean delivery</b>	<b>20(60.6%)</b>
Elective/Scheduled	4(20.0%)
Unscheduled non-emergent	2(10.0%)
Emergent	10(50.0%)
Peri- or post-mortem	3(15.0%)
Other	1(5.0%)
<b>Undelivered</b>	<b>6 (18.2%)</b>
<b>Total</b>	<b>33 (100%)</b>

Source: NYS MMR

Among the 20 cesarean deliveries, 50% were from Black, non-Hispanic women, 25% were from White, non-Hispanic women, 20% were from Hispanic women, and 5% were from Other, non-Hispanic women. A comparison of distribution of cesarean deliveries by race/ethnicity between all women in NYS and women in the pregnancy-related death cohort shows that pregnancy-related death cohort has a much higher percentage of Black, non-Hispanic women compared to all women in NYS (50.0% vs 17.2%) (Figure 8).

**Figure 9. Cesarean delivery among NYS live births and pregnancy-related deaths by mother's race/ethnicity, 2014**



## Section 4: Findings from the 2014 Cohort

Among the 20 cesarean deliveries, eight reported one indication, six had two indications, five had three indications and one had no reported indications for cesarean delivery. The most frequent indications for cesarean delivery were maternal disease, repeat cesarean delivery, fetal intolerance and preeclampsia (Table 8).

**Table 8. NYS pregnancy-related deaths: indication for cesarean delivery, 2014**

Indication for Cesarean delivery	Count (%)
Maternal disease	11(30.6%)
Repeat Cesarean delivery	7(19.4%)
Fetal intolerance	7(19.4%)
Preeclampsia	4(11.1%)
Malpresentation	2(5.6%)
Other	1(2.8%)
Hemolysis, elevated liver enzymes and low platelet count (HELLP)	1(2.8%)
Chorioamnionitis	1(2.8%)
Multiple gestation	1(2.8%)
Unknown	1(2.8%)
<b>Total</b>	<b>36 (100%)</b>

Source: NYS MMR

### Obstetric complications during labor and delivery

Among the pregnancy-related death cohort that delivered (n=27), forty-three percent of the women did not have any reported obstetric complications during labor and delivery (40.7%, 11/27, not shown). More than a third of women had one complication (37.0%, 10/27), approximately 11% had two complications and (11.1%, 3/27) had three complications. Among the 16 women with complications, the most frequently reported were related to hypertensive disorders (24%, n=6) and fetal growth restriction (12%, n=3) (Table 9).

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**Table 9. NYS pregnancy-related deaths: complications during labor & delivery, 2014**

Type of complication	Count (%)
Hypertensive disorders	6(24.0%)
Preeclampsia	4(16.0%)
HELLP syndrome	1(4.0%)
Eclampsia	1(4.0%)
Fetal growth restriction	3(12.0%)
Premature labor	3(12.0%)
Gestational diabetes mellitus, A2	2(8.0%)
Premature rupture of membranes	2(8.0%)
Hemorrhage	1(4.0%)
Chorioamnionitis	1(4.0%)
Polyhydramnios	1(4.0%)
Other	6(24.0%)
<b>Total</b>	<b>25(100%)</b>

Source: NYS MMR

Among the 27 women who delivered, over half of the deliveries had placental complications reported (70.4%, n=19). The most frequent placental complication reported was manual removal of the placenta (66.7%, n=18) (Table 10).

**Table 10. NYS pregnancy-related deaths: placental complications during labor & delivery, 2014**

Placental complication reported Type of complication	Count (%)
Yes*	19(70.4%)
Manual removal of placenta	18(66.7%)
Abruptio placenta	1(3.7%)
Percreta, increta or accreta	1(3.7%)
No	6(22.2%)
Unknown	2(7.4%)
<b>Total</b>	<b>27(100%)</b>

Note: \* one case indicated both percreta and manual removal as complications.

Source: NYS MMR

Most cases (n=18) had only one type of anesthesia for labor and delivery. Only one case had two types administered. General anesthesia (40% of the cases) and spinal anesthesia (40% of the cases) were the most frequent types administered, followed by epidural (15.0% of the cases) (data not shown).



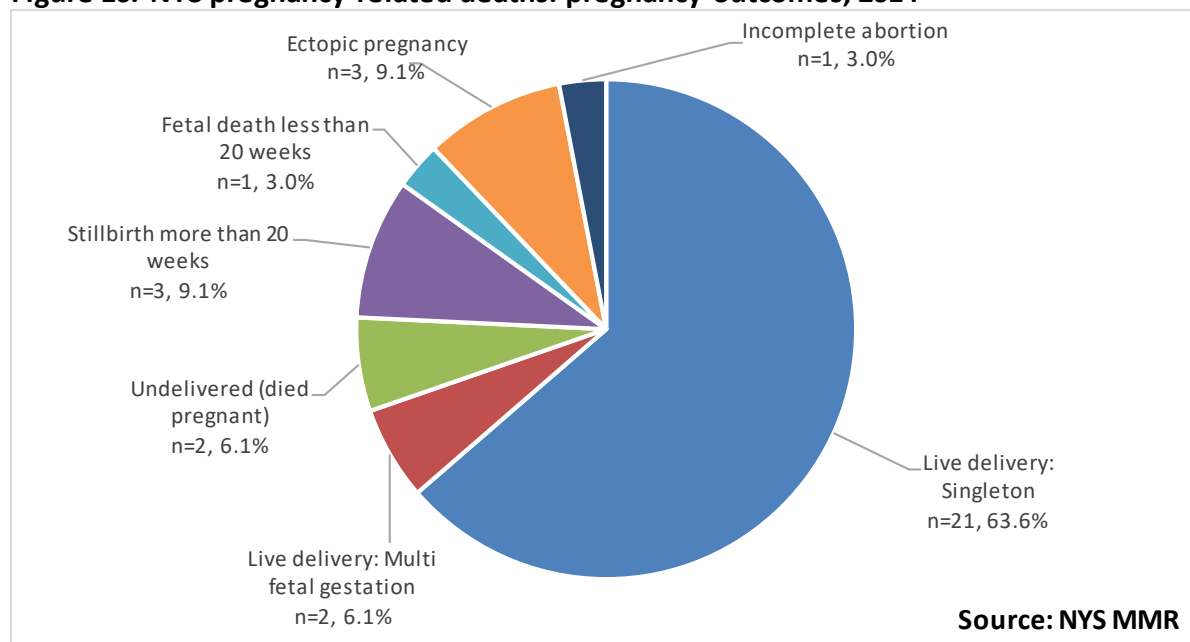
## Section 4: Findings from the 2014 Cohort

Blood transfusions were noted in 19 of the 33 pregnancy-related deaths. Six women had both prenatal and postpartum blood transfusions. Thirteen women had postpartum blood transfusions (data not shown).

### Pregnancy outcomes

The most frequent pregnancy outcome was a live singleton baby (63.6%). Women who died while still pregnant and were undelivered, ectopic pregnancy, and stillbirths represented 24.2% of the cohort each. (Figure 9).

**Figure 10. NYS pregnancy-related deaths: pregnancy outcomes, 2014**



### ***Postpartum history***

#### Postpartum complications

In contrast with the complications reported during labor and delivery, the reported postpartum complications were more extensive and point to a wide array of health issues. There were 31 women in the pregnancy-related death cohort with reported postpartum complications after delivery. The most frequently reported postpartum complication for the 2014 pregnancy-related death cohort, excluding the two women who died while pregnant, was cardiopulmonary arrest/collapse (77.4%), followed by sepsis (41.9%) and acute respiratory distress syndrome (35.5%). There was one case with no postpartum complications reported (Table 11).

## Section 4: Findings from the 2014 Cohort

**Table 11. NYS pregnancy-related deaths: postpartum complications, 2014**

Type of complication	Count (% of total deliveries excluding two died undelivered)
Cardiopulmonary arrest/collapse	24(77.4%)
Sepsis/Septic shock	13(41.9%)
Acute respiratory distress syndrome	11(35.5%)
Hemorrhage	9(29.0%)
Disseminated intravascular coagulation	9(29.0%)
Embolism	7(22.6%)
Shock (hemorrhagic, hypovolemic)	7(22.6%)
Cardiomyopathy	5(16.1%)
Infection	5(16.1%)
Hypertensive disorders	4(12.9%)
-Preeclampsia	2(6.5%)
-HELLP	2(6.5%)
Congestive heart failure	3(9.7%)
Stroke (thrombotic or hemorrhagic)	2(6.5%)
Other	7(22.6%)
No complications	1(3.2%)
<b>Total delivery excluding two died undelivered</b>	<b>31(100%)</b>

Source: NYS MMR

Most of the complications occurred in women with cesarean deliveries (64.5%, n=20). There was one woman with only one complication, who had a cesarean delivery. Out of the eight women with two complications, five had cesarean deliveries. Out of the 21 women with three or more complications, only five women had normal vaginal deliveries and 13 had cesarean deliveries. (Table 12).

## Section 4: Findings from the 2014 Cohort

**Table 12. NYS pregnancy-related deaths: postpartum complications by type of delivery, 2014**

Type of delivery	Number of Complications Reported				Count (% of total deliveries excluding two died undelivered)
	0	1	2	3 or more	
<b>Termination of pregnancy (ectopic pregnancy/abortion)</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>4 (12.9%)</b>
<b>NSVD</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>7(22.6%)</b>
<b>Cesarean delivery</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>13</b>	<b>20(64.5%)</b>
Elective/Scheduled	0	0	1	3	
Unscheduled non-emergent	0	0	1	1	
Emergent	0	1	1	8	
Peri- or post-mortem	1	0	1	1	
Other	0	0	1	0	
<b>Total deliveries excluding two died undelivered</b>	<b>1</b>	<b>1</b>	<b>8</b>	<b>21</b>	<b>31(100%)</b>

Source: NYS MMR

Blood transfusions were administered in the postpartum period for 19 women in the pregnancy-related death cohort. Sixteen of these 19 women delivered and transfusions were administered mainly for women who had cesarean deliveries (68.4%, n=13) (Table 13).

**Table 13. NYS pregnancy-related deaths: postpartum blood products by type of delivery, 2014**

Type of delivery with blood transfusion	Count (% of total deliveries excluding two died undelivered)
<b>Termination of pregnancy (ectopic pregnancy/abortion)</b>	<b>3 (15.8%)</b>
<b>NSVD</b>	<b>3 (15.8%)</b>
<b>Cesarean delivery</b>	<b>13(68.4%)</b>
Elective/Scheduled	2(10.5%)
Unscheduled non-emergent	0(0%)
Emergent	9(47.4%)
Peri- or post-mortem	2(10.5%)
Other	0(0%)
<b>Total deliveries</b>	<b>19(100%)</b>

Source: NYS MMR

## Section 4: Findings from the 2014 Cohort

### *Risk and screenings factors*

#### **Provider-identified risk factors**

Risk factors were documented for 93.9% (n=31) of the women in the pregnancy-related death cohort. Nearly one-third of the women had one to three risk factors and a quarter had six risk factors (Table 14). On average, 4.5 risk factors were reported for each woman.

**Table 14. NYS pregnancy-related deaths: number of provider-identified risk factors, 2014**

Number of risk factors	Count (%)
0	2(6.1%)
1	4(12.1%)
2	4(12.1%)
3	4(12.1%)
4	1(3.0%)
5	3(9.1%)
6	8(24.2%)
7	1(3.0%)
8	5(15.2%)
11	1(3.0%)
<b>149 risk factors reported</b>	<b>33 pregnancy-related cases</b>

Source: NYS MMR

Obstetric history, defined as history of induced and/or spontaneous terminations of pregnancy, previous cesarean births and incompetent cervix, was the most frequent risk factor in the pregnancy-related death cohort. Hematologic, psychosocial, obesity and pulmonary were the next most reported risk factors. Except for cardiac risk, the highest occurring risk factors were documented mostly for Black, non-Hispanic women. Cardiac risk was documented more frequently for Hispanic women (Table 15).

## Section 4: Findings from the 2014 Cohort

**Table 15. NYS pregnancy-related deaths: provider-identified risk factors by race/ ethnicity, 2014**

Risk factor category	Race/Ethnicity				Total
	Black, non-Hispanic	White, non-Hispanic	Other, non-Hispanic	Hispanic	
Obstetric history	18	6	0	4	28
Hematologic risk	9	1	0	2	12
Psychosocial risk	6	4	0	2	12
Obesity	7	3	0	1	11
Pulmonary	5	2	2	2	11
Psychiatric risk	5	2	0	2	9
Cardiac risk	2	1	0	4	7
Endocrine	3	2	0	2	7
Hypertension	5	1	0	1	7
Metabolic risk	0	3	0	0	3
Neurologic risk	1	1	0	0	2
Substance use	0	1	0	1	2
Epilepsy/Seizure	0	0	0	1	1
Other	17	15	1	4	37
<b>Total</b>	<b>78</b>	<b>42</b>	<b>3</b>	<b>26</b>	<b>149</b>

Source: NYS MMR

### **Mental illness screening**

Mental illness screening prior to pregnancy was reported for seven cases. All seven cases were screened for depression and five were positive. Three of the five women with depression were referred to treatment. There was one woman screened for PTSD and anxiety in addition to depression screening, who was positive for both depression and anxiety; another woman was screened for both depression and suicide risk, but neither was positive.

Over half of the pregnancy-related death cohort (51.5%, n=17) were screened for mental illness during pregnancy. Among those, a total of four women were noted positive; two for depression and two for both depression and anxiety. Only two women with positive screening results were referred to treatment. Six of the seven women who received mental illness screening prior to pregnancy also had screening during pregnancy. Intrapartum and postpartum mental illness screening were noted for seven and six women respectively, and none were positive.

## Section 4: Findings from the 2014 Cohort

The most frequent mental illness screened prior to and during pregnancy as well as intrapartum and postpartum was depression.

### **Intimate partner violence screening**

Intimate partner violence (IPV) screening prior to pregnancy was infrequently reported. Only two women were recorded as screened, and one reported IPV. Over half of the pregnancy-related death cohort (51.5%, n=17) were screened for IPV during pregnancy and two reported positive. The one woman who reported experiencing IPV prior to pregnancy still reported IPV during pregnancy when screened. Six women screened for IPV during intrapartum and none reported IPV. Among the seven women who received postpartum screening for IPV, one was noted having IPV.

### **Substance use screening**

Nine women were reported to have a verbal screening and one had urine/blood screening for substance use prior to pregnancy. There were 22 (66.7%) women reported who were screened for substance use during pregnancy. Among those, three had both verbal and urine/blood screening, two had urine/blood screening and 17 had verbal screening. Eight women were recorded for intrapartum substance use screening with seven of them had verbal screening. Nine women were recorded for postpartum substance use screening with seven of them had verbal screening.

There were only two women who reported to have screening for substance use prior to and during pregnancy as well as intrapartum and postpartum periods; one woman had screening during pregnancy, intrapartum and postpartum periods.

None of the cases noted with substance use screening were reported to receive a referral to treatment or reported to refuse treatment prior to and during pregnancy, intrapartum or postpartum periods.

### **Cigarette and alcohol use**

Cigarette use was noted for nine women prior to pregnancy and five of them continued to smoke during pregnancy. Alcohol use was noted for five women prior to pregnancy and none of them were noted as continuing during pregnancy. There were two women noted as using both cigarette and alcohol prior to pregnancy but didn't continue during the pregnancy.

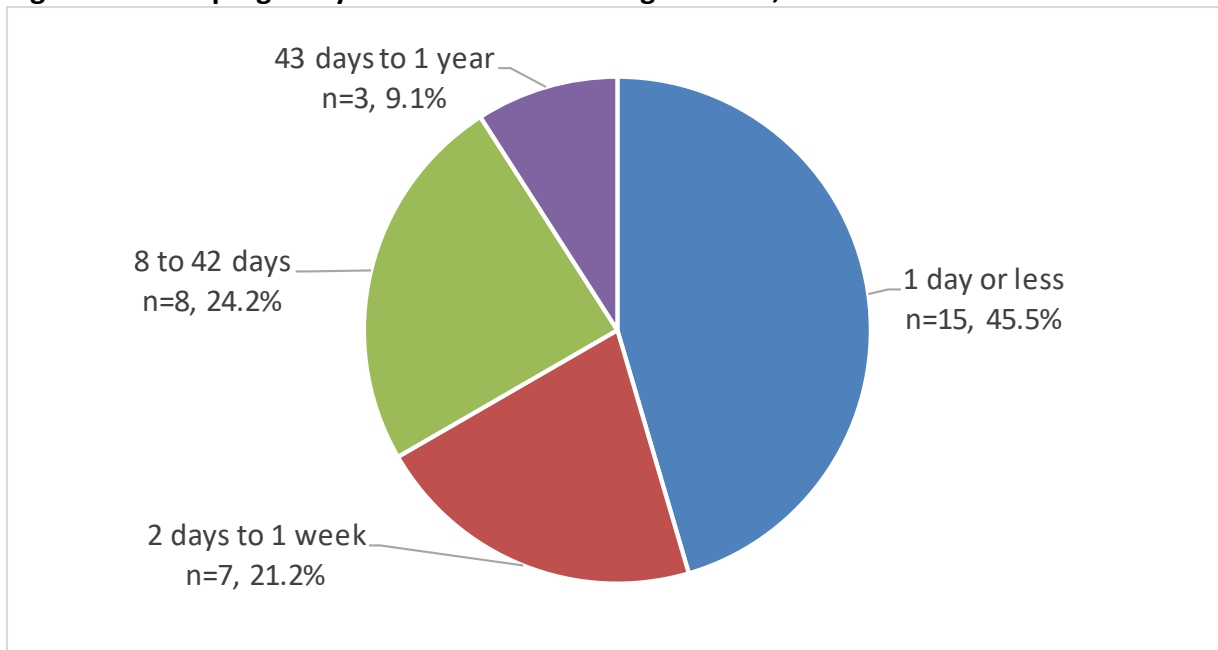
### ***Maternal mortality***

#### **Timing of death**

Over half of the pregnancy-related deaths occurred within a week of the end of the pregnancy (66.7%, n=22, Figure 10). The largest proportion of deaths occurred the day after the end of pregnancy (45.5%, n=15).

## Section 4: Findings from the 2014 Cohort

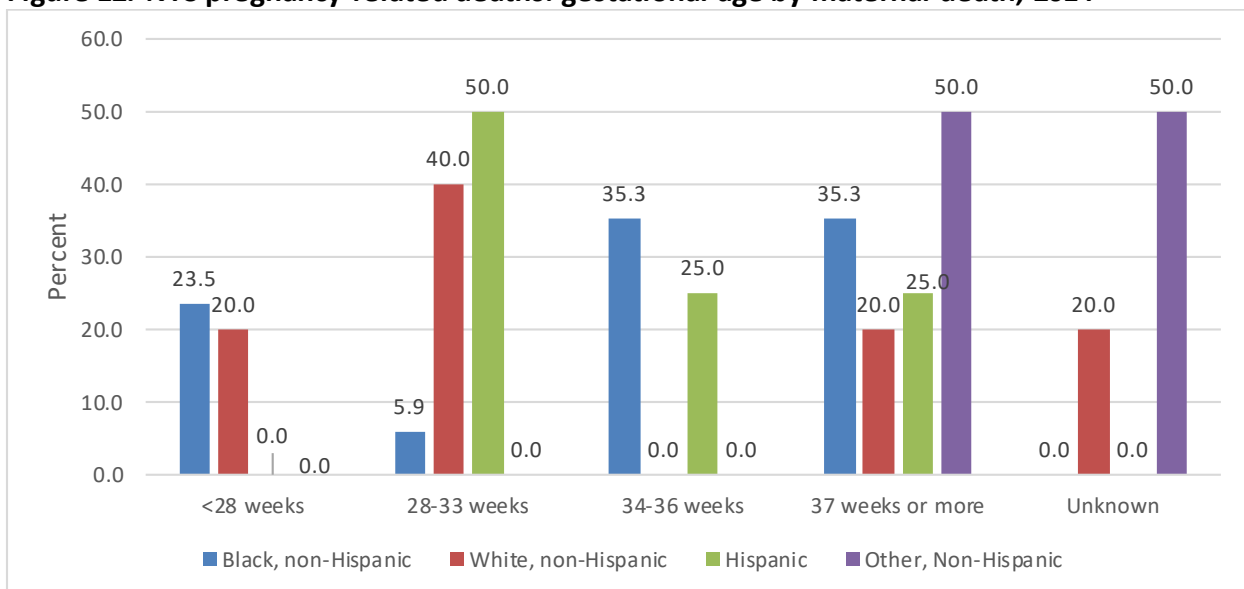
**Figure 11. NYS pregnancy-related deaths: timing of death, 2014**



Source: NYS MMR

Women with full-term pregnancies represented the largest proportion of deaths for Black, non-Hispanic and other, non-Hispanic groups, while women with gestational age of 28-33 weeks at the time of death represented the largest proportion of deaths for White, non-Hispanic and Hispanic groups (Figure 11).

**Figure 12. NYS pregnancy-related deaths: gestational age by maternal death, 2014**



Source: NYS MMR

## Section 4: Findings from the 2014 Cohort

### Cause of death

The top leading MMR causes of death were infection (21.2%); hemorrhage (15.2%); and cardiomyopathy, embolism (not cerebral), and pulmonary problems (12.1% respectively) (Table 16).

**Table 16. NYS pregnancy-related deaths: MMR cause of death, 2014**

MMR cause of death	Count (%)
Infection	7(21.2%)
Hemorrhage	5(15.2%)
Cardiomyopathy	4(12.1%)
Embolism (not cerebral)	4(12.1%)
Pulmonary problems	4(12.1%)
Cardiovascular problems	3(9.1%)
Intracerebral hemorrhage (not associated with pregnancy-induced hypertension (PIH))	2(6.1%)
Neurologic/Neurovascular problems	2(6.1%)
Other	2(6.1%)
<b>Total</b>	<b>33(100%)</b>

Source: NYS MMR

Selected maternal characteristics were explored for the leading MMR causes of death (Table 17). Black, non-Hispanic women had the highest number of deaths for hemorrhage and White, non-Hispanic women had the largest number of deaths from infection. Infection, hemorrhage cardiomyopathy and pulmonary problem deaths happened mostly for the age group of 30-34 years. At least half of the women in the embolism, infection, and cardiomyopathy groups were overweight or obese. Cesarean delivery was the most common mode of delivery for those with infection, hemorrhage and cardiomyopathy, while NSVD was the most common mode of delivery for those with embolism and pulmonary causes. Death due to infection, cardiomyopathy and pulmonary problems occurred within a week after the termination of pregnancy, while deaths due to hemorrhage and embolism occurred within two weeks after the termination of pregnancy.



## Section 4: Findings from the 2014 Cohort

**Table 17. NYS pregnancy-related deaths: selected characteristics of the mother, type of delivery, timing of death and pregnancy outcome by leading MMR causes of death, 2014**

Characteristics	Infection N=7	Hemorrhage N=5	Cardiomyopathy N=4	Embolism N=4	Pulmonary Problem N=4
<b>Race</b>					
Black, non-Hispanic	2	4	3	2	3
White, non-Hispanic	4	0	1	2	0
Hispanic	1	1	0	0	0
Other, non-Hispanic	0	0	0	0	1
<b>Age</b>					
<20	0	0	0	0	0
20-24	2	0	0	1	0
25-29	0	1	0	0	1
30-34	3	4	3	1	3
35-39	1	0	1	2	0
40+	1	0	0	0	0
<b>BMI</b>					
BMI<18.5, Thin	0	0	0	0	0
18.5<=BMI<25, Normal	2	2	2	1	2
25<=BMI<30, Overweight	0	1	0	0	1
BMI>=30, Obese	3	0	2	3	0
Unknown	2	2	0	0	1
<b>Type of delivery</b>					
Cesarean delivery	5	2	4	1	1
NSVD	1	1	0	2	2
Undelivered	1	2	0	1	1
<b>Timing of death after the end of pregnancy in days</b>					
Mean, Median	4.4, 1.0	7.6, 1.0	4.5, 2.0	11.0, 0.0	6.3, 3.0
<b>Pregnancy outcome</b>					
Live delivery: singleton	6	1	3	2	2
Live delivery: multi fetal	0	1	0	0	0
Undelivered	0	0	0	1	1
Still birth > 20 weeks	0	0	1	1	1
Fetal death <20 weeks	0	1	0	0	0
Ectopic pregnancy	0	2	0	0	0
Incomplete abortion	1	0	0	0	0

Source: NYS MMR

## Section 4: Findings from the 2014 Cohort

### Contributing factors of death

According to CDC, the factors that contributed to a pregnancy-related death include adherence to medical recommendations, knowledge regarding importance of event or of treatment or follow-up, mental health conditions, tobacco use, etc. These contributing factors fall into five levels: patient/family, provider, facility, system and community<sup>4</sup>.

Contributing factors in the patient/family level were recorded for 31 pregnancy-related deaths. The most-reported factor (n=24) was “chronic medical condition”. Contributing factors in the provider category were recorded for eight pregnancy-related deaths. The most-reported factor (n=4) was “delay in or lack of diagnosis and treatment”. Contributing factors in the system level were recorded for three pregnancy-related deaths with two in “inadequate communication (among staff of same hospital, between departments, within teams)” and one in “policies/procedures”. There was only one case with reported contributing factors in the facility level, these contributing factors included “clinical skill/quality of care”, “inability of provide certain services/equipment” and “policies/procedures”. There was also one case with recorded contributing factors in the community level with the factor being “tobacco use”.

### Preventability of the death

A death is considered preventable if the reviewer determined that there was at least some chance of death being averted by one or more reasonable changes to patient, family, provider, facility, system and/or community factors<sup>4</sup>. Over half (54.5%, n=18) of the pregnancy-related deaths were not preventable. Nine cases (27.2%) among the pregnancy-related deaths were considered preventable with six of them having a good or strong chance to alter the outcome and one case having some chance. There were five cases where preventability was unable to be determined, with one case that had some chance of altering the outcome (Table 18).

**Table 18. NYS pregnancy-related deaths and preventability of the death, 2014**

Preventability	Total	Chance to alter the outcome				
		Strong	Good	Some	None	Missing
Preventable	9	3	3	1	2	0
Not preventable	18	0	0	0	18	0
Unable to determine	5	0	0	1	2	2
Missing	1	0	0	0	1	0
<b>Total</b>	<b>33</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>23</b>	<b>2</b>

Source: NYS MMR

<sup>4</sup> Review to Action. *Maternal Mortality Review committee Facilitation Guide*. Retrieved from <https://reviewtoaction.org/content/mmria-committee-facilitation-guide>

## Section 4: Findings from the 2014 Cohort

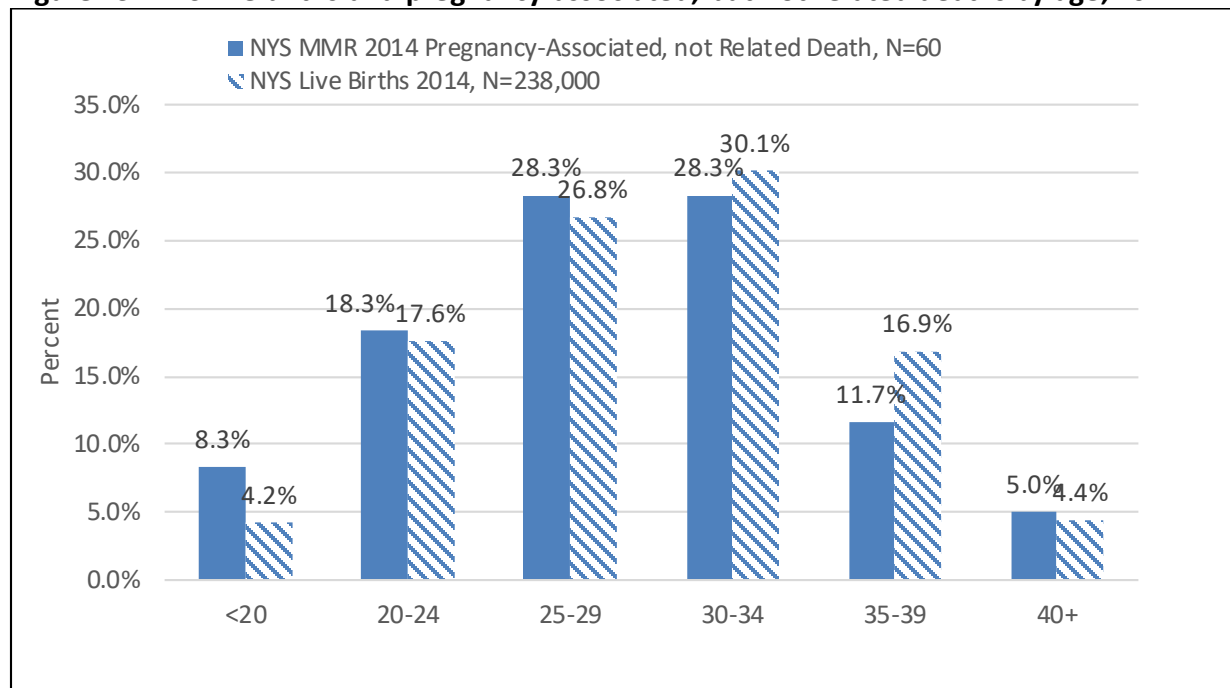
### Pregnancy-associated, but not related deaths

#### Demographics

A total of 60 pregnancy-associated, but not related deaths were ascertained through death records linked to birth records (55.0%), inpatient (13.3%) and outpatient (30.0%) hospital records with an indication of pregnancy (list of ICD codes available upon request). A small percent (1.7%) were unlinked deaths.

The ages of women in the pregnancy-associated, but not related death cohort were similar to those of women with live births in 2014 (Figure 12).

**Figure 13: NYS live births and pregnancy-associated, but not related deaths by age, 2014**



Source: NYS MMR and NYS Vital Statistics

The women in the pregnancy-associated, not related death cohort were mostly White, non-Hispanic (46.7%, n=28). Black, non-Hispanic women represented about a third of this cohort (30.0%, n=18). Hispanic represented 15.0% of these deaths and about six percent were of other races (6.7%). Nearly half of the women in the pregnancy-associated, not related cohort were on Medicaid (43.3%, n=26) and more than half of them had less than an associate's degree (68.3%). The majority of pregnancy-associated, not related deaths occurred for women aged 20-29 years old (56.7%, n=34) (Table 19).

## Section 4: Findings from the 2014 Cohort

**Table 19. NYS pregnancy-associated, not related deaths: selected maternal demographic characteristics, 2014**

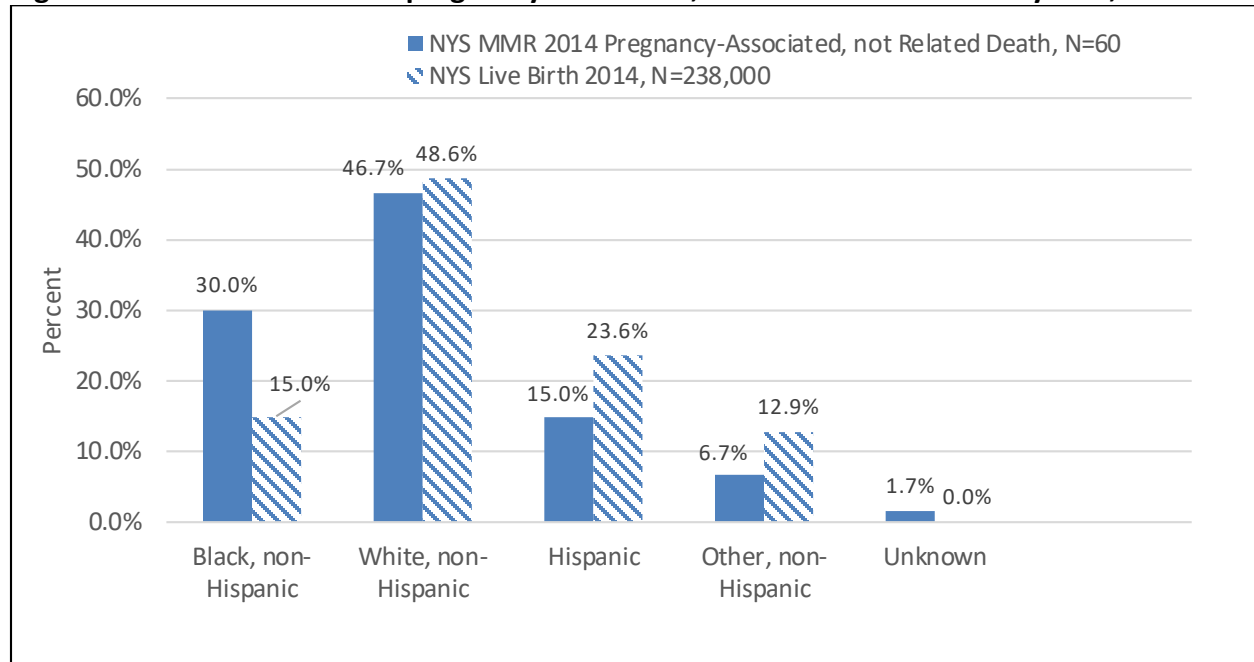
Demographic characteristics	Count (%)
<b>Race</b>	
Black, non-Hispanic	18 (30.0%)
White, non-Hispanic	28 (46.7%)
Hispanic	9 (15.0%)
Other, non-Hispanic	4(6.7%)
Unknown	1(1.7%)
<b>Age at death</b>	
<20	5(8.3%)
20-24	11 (18.3%)
25-29	17 (28.3%)
30-34	17 (28.3%)
35-39	7(11.6%)
40+	3(5.0%)
<b>Employment Status</b>	
Employed	22 (36.7%)
Unemployed	12 (20.0%)
Unknown	26 (43.3%)
<b>Occupation</b>	
Unemployed	9 (15.0%)
Professional/Management	11 (18.3%)
Homemaker	6 (10.0%)
Service/Housekeeper/Childcare	9 (15.0%)
Sales/Administrative Support	6 (10.0%)
Student	5 (8.3%)
Other	3 (5.0%)
Unknown	11(18.3%)
<b>Education</b>	
Less than high school	10(16.7%)
High School /GED/Some college	31(51.7%)
Associate's/Bachelor's degree	11(18.3%)
Graduate degree or higher	2 (3.3%)
Unknown	6 (10.0%)
<b>Health insurance</b>	
Medicaid/Family Health Plus	26 (43.3%)
Private insurance	15(25.0%)
Other	2 (3.3%)
Unknown	17(28.3%)
<b>Total</b>	<b>60 (100%)</b>

Source: NYS MMR and NYS Vital Statistics

## Section 4: Findings from the 2014 Cohort

When compared to the women with live births in 2014, Black, non-Hispanic women were overrepresented in the pregnancy-associated, not related cohort. About a third of the pregnancy-associated, not related deaths were to Black, non-Hispanic women while births to Black, non-Hispanic women represented 15.0% of all births (Figure 13).

**Figure 14: NYS live births and pregnancy-associated, but not related deaths by race, 2014**



Source: NYS MMR and NYS Vital Statistics

### Cause of death

The top five causes of death representing 71% of all pregnancy-associated, not related cases were injury (55.0%), cancer (10.0%), neurologic/neurovascular problems (6.7%), pulmonary problems (6.7%) and infection (3.3%). Over a third of the injuries were substance overdose (36.4%, 12/33), followed by motor vehicle accidents (27.3%, 9/33), homicides (24.2%, 8/33), suicides and intentional injuries (9.1%, 3/33), and Other (3.0%, 1/33) (Table 20).

**Table 20. NYS pregnancy-associated, but not related deaths: causes of death, 2014**

MMR cause of death	Count (%)
<b>Injury (intentional or non-intentional)</b>	<b>33 (55.0%)</b>
Substance overdose	12 (36.4%)
Motor vehicle accident	9(27.3%)
Homicide	8(24.2%)
Suicide/Intentional injuries	3(9.1%)
Other	1(3.0%)
Cancer (benign or malignant tumor/disease), includes genital tract neoplasm	6(10.0%)

## Section 4: Findings from the 2014 Cohort

Neurologic/Neurovascular problems	4(6.7%)
Pulmonary problems	4(6.7%)
Infection	2(3.3%)
Cardiac arrest/failure	1(1.7%)
Cardiomyopathy	1(1.7%)
Intracerebral hemorrhage (not associated with PIH)	1(1.7%)
Anesthesia complications	1(1.7%)
Cardiovascular problems	1(1.7%)
Hypertensive disorders	1(1.7%)
Other	3(5.0%)
Unknown	2(3.3%)
<b>Total</b>	<b>60(100%)</b>

Source: NYS MMR

## Section 5: Other MMR Related Reports and Websites

The Department has published NYS Maternal Mortality Review Reports since 2016, the previous reports are available on the Department's website.

### **2012-2013 Cohort**

[https://www.health.ny.gov/community/adults/women/docs/maternal\\_mortality\\_review\\_2012-2013.pdf](https://www.health.ny.gov/community/adults/women/docs/maternal_mortality_review_2012-2013.pdf)

### **2006-2008 Cohort**

[https://www.health.ny.gov/community/adults/women/docs/maternal\\_mortality\\_review\\_2006-2008.pdf](https://www.health.ny.gov/community/adults/women/docs/maternal_mortality_review_2006-2008.pdf)

## **Feedback**

We welcome suggestions and comments on this publication. Please contact Dr. Marilyn Kacica, Medical Director, or Joanne Guo, Maternal Mortality Review Program Director, at:

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## Section 6: Appendix

### Acronyms

**ACOG:** American Congress of Obstetricians and Gynecologists

**ARDS:** acute respiratory distress syndrome

**BMI:** body mass index

**HELLP:** hemolysis, elevated liver enzymes and low platelet count.

**ICD9:** International Statistical Classification of Diseases and Related Health Problems 9th Revision. A publication, 9<sup>th</sup> revision, from the World Health Organization comprising of a set of codes that are used worldwide to classify diseases and injuries.

**ICD10:** 10th revision of the [International Statistical Classification of Diseases and Related Health Problems](#) (ICD), a [medical classification](#) list by the [World Health Organization](#) (WHO). The WHO copyrighted ICD-10 in 1990. Since then, countries around the world have adopted it to report mortality and morbidity. The United States began using it in 1999 to report mortality only. It codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases.

**ITP:** idiopathic thrombocytopenic purpura

**Maternal death:** Defined by the World Health Organization as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.”

**MMR:** Maternal Mortality Review initiative led by the New York State Department of Health.

**NOS:** not otherwise specified.

**NYC:** five boroughs of New York City.

**NYPORTS:** New York Patient Occurrence and Reporting and Tracking System. A statewide mandatory reporting system that collects information from hospitals and diagnostic treatment centers concerning adverse events defined as unintended, adverse and undesirable developments in a patient’s condition. The maternal deaths are one of the 31 occurrences reportable to NYPORTS.

**PIH:** Pregnancy-induced hypertension

**ROS:** All the counties in New York State except the five boroughs of New York City.

**SPARCS:** Statewide Planning and Research Cooperative System. A comprehensive data reporting system established in 1979 as a result of cooperation between the health care industry and government. Initially created to collect information on discharges from hospitals, SPARCS currently collects patient-level detail on patient characteristics, diagnoses and treatments, services, and charges for every hospital discharge, ambulatory surgery patient, and emergency department admission in New York State.

**SPDS:** Statewide Perinatal Data System. An electronic maternal and newborn data collection and analysis system established and maintained by the Department of Health which includes the data elements, organized in modules, which comprise the New York State Certificate of Live Birth for births occurring in New York State outside of New York City, or the New York City Certificate of Live Birth for births occurring in New York City, and other data elements which relate to maternal and newborn health and care in hospitals and freestanding birthing centers.